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ABSTRACT

Several counseling methods have attempted to help individuals change their behavior patterns. Techniques that teach control of the internal functions of the mind, body, and emotions are designed to allow the individual to reach his/her potential. Alpha training is one such method that is concerned with a brain wave pattern yielding an alert, non-focused but relaxed state. Because there appear to be differences between brain wave patterns of adults and children, counselors should be careful in their considerations of the client as a unique individual. Alpha training appears to be helpful as a stress management technique, but its relationship to achievement is inconclusive. In a recent study of alpha wave patterns, wrist temperature, and the use of autogenic relaxation training with middle school students no significant differences were found between experimental and control groups who were learning French. However there was a dramatic difference in retention: students who received relaxation training dropped out of the French class at a much lower rate. These findings suggest that a major use for alpha training is in the area of psychological self-exploration. (JAC)

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ALPHA TRAINING: A TECHNIQUE FOR CHANGING BEHAVIOR IN CHILDREN AND ADULTS

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ALPHA TRAINING: A TECHNIQUE FOR CHANGING BEHAVIOR IN CHILDREN AND ADULTS

Introduction

In recent years a number of methods have been tried to assist an individual in changing one's behavioral patterns. Among such methods are Transcendental Meditation, Yoga, Hyponedia, Suggestopedia, Autogenic Training, Progressive Relaxation, and Biofeedback. The techniques are designed to teach a person to control the internal functions of the mind, body, and state of emotional balance, and, therefore, to allow one to reach one's human potential. It is suggested that when the mind controls the body, the long-term effects from daily practice include: (1) mental integration or clarity of thought; (2) emotional integration and balance; (3) more effective sleep; (4) increased resistance to stress, fatigue, and disease; and (5) better performance on tests of speed and accuracy (Sexton and Poling, 1973).

Alpha training, the method for helping the mind control the body which is discussed in this paper, is concerned with a brain wave pattern yielding an alert, non-focused but relaxed state. Alpha rhythms are from 8 to 12 Hz or cycles per second. Metabolically speaking, it is associated with a low arousal level. It is estimated that 90 percent of the human population produces brief bursts of alpha waves hundreds of times each day when these members of the population close their eyes for a second or two, and also when their attention is focused on some interior image or

daydream, even if their eyes are open (Green and Green, 1977). However, to control consciously the brain waves so that they stay in the alpha range usually takes training.

Other brain wave patterns are the beta, theta, and delta. The beta waves, from 13 to 25 cycles per second, are associated with normal, focused, rational thought. Theta waves, from 4 to 8 cycles per second, are associated with a state of reverie, a twilight state, usually experienced just before sleep and linked to creativity. It's a time when thoughts and images seem to spring up from nowhere and when the mind is thinking without direction, on its own. Delta, below 3 cycles per second, is sleep.

Brain wave patterns have no sensory concomitants; that is, there are no sensory processes by means of which one can detect the presence of brain wave activity. One can detect tense muscles, cold hands, or a pounding heart, but there is no way to sense one's own brain wave activity. What one senses and controls is not the brain wave itself, but a state of consciousness. For instance, even though one can usually tell the difference between hot and cold hands, the way one actually learns to warm the hands or any other part of the body is through imagining a feeling of warmth permeating the part of the body in which blood flow is to be increased. Learning to control brain wave patterns does not depend on normal sensory feedback, but on the development of an awareness of subtle internal sensations that normally one does not notice until a feedback device tells what is happening. Through the use of this increased awareness one can train the body to function more optimally (Green and Green, 197[illegible]).

The biofeedback instrument used in alpha training is the encephalograph analyzer. The encephalograph traces the frequency and amplitude of the brain wave and is known as an electroencephalogram or EEG. The human brain produces a continuous output of minute electrical signals. The strength of these signals is so small that it is measured in microvolts, or millionths of a volt. The signals can be accurately detected and recorded, however. To detect and record the electrical charges, they must first be picked up by electrodes or sensors attached to the surface of the scalp and then amplified many thousands of times before they can be analyzed.

Placement of sensors makes a difference in the feedback information. For instance, the occipital lobe is concerned with vision, the temporal lobe controls hearing, the frontal lobe directs motor activity, and the parietal lobe is associated with body senses (Restak, 1979). Research has also determined that hemispheres of the brain specialize in modes of processing information. For a large portion of the population the left hemisphere processes data through a rational, sequential, and analytic procedure; the right hemisphere, however, uses simultaneous, holistic, spatial, and intuitive operations (Sperry, 1975; Ornstein, 1976; and Levy and Trevarthen, 1977). Therefore it is essential in alpha training to place sensors or electrodes on the area of the brain which will yield the kind of information for the purpose of the training.

This paper will discuss research in the literature and that conducted by the author to illustrate purposes for which alpha training might be useful. Although biofeedback instrumentation, and EEG in particularly,

is in its infancy in the helping profession, biofeedback appears to be a tool, if utilized, that could be useful in changing behavioral patterns.

The Relationship of Alpha to Age and Sex

There appears to be some difference between brain wave patterns of adults and children which accounts for the ease with which children can stay in the 8 to 13 Hz range. Alpha activity is found in abundance in children but tends to decrease with age. Beta activity, on the other hand, tends to increase with age, providing support for the theroy that maturation of the human brain continues into the middle years (Vogel, 1965). Beta activity is associated with a concentrated, narrow focus, and is the kind of mental pattern needed to learn to read, do mathematics, solve chemistry equations, and excel in most sciences. Dominant brain wave frequencies for age levels will be explored in the forthcoming paragraphs.

Fois (1961) describes the EEG patterns that are characteristic of different age groups. The two-to three-year-old range is characterized by a basic waking rhythm with a dominant frequency of 6 to 8 Hz that is best developed in the parietal and occipital areas although some 4 to 5 Hz waves are still seen. During the four to five-year period there is a slight increase in dominant frequency and more uniform records are seen, but the records are still basically like those seen at two to three years of age. Occasionally some 8 to 10 Hz activity is seen as well as some 4 to 5 Hz activity. However, by this age, definite inter-hemispheric asymmetries are considered abnormal.

By seven, the basic rhythm is 7 to 9 Hz but some slow 5 to 6 Hz activity is still present as is some 10 to 12 Hz activity. By seven, however, the waves are symmetrical. By ten years of age, the voltage is lower than in the younger child and 8 to 12 Hz activity is generally the dominant frequency. The dominant rhythm is best developed in the occipital area. In general, the higher the frequency, the lower the voltage. By eleven to fourteen years there is a tendency to show the adult rhythms. There is further decrease in voltage with increasing age and slow activity becomes rare (Fois, 1961).

According to the theory that less alpha or a preponderance of high alpha shows greater growth, the EEG pattern, as well as other factors indicates girls mature faster than boys. Henry (1944) in a longitudinal study of 95 children over at least a five-year period reported there is a tendency for girls to show faster mean alpha frequencies than boys for every age level between five and seventeen. Petersen and Eeg-Olofsson (1971) also found in a longitudinal and transverse study of 389 girls and 354 boys that alpha frequency increased linearly with age and that girls showed higher frequencies than boys.

Matousel, Volavka, Roubicek and Roth (1967), looked at age dependent changes in 106 normal adults (61 males, 45 females) aged 17 through 64, with a mean age equal to 32.9. They found that alpha activity as a whole decreases with age, with $alpha_2$ (9.5 - 12.5 Hz) decreasing more than $alpha_1$ (7.5 - 9.5 Hz). This decrease is significant for the entire group. The data suggest that the $alpha_1/alpha_2$ ratio is approximately constant in the age range from 17 to 35, with the increase in the amount of $alpha_1$ beginning in the fourth decade of life.

When measuring alpha, it is difficult to isolate it from the rest of the brain wave patterns. However, the average human adult exhibits alpha activity only between one and perhaps 20 percent of the time when the eyes are open and anywhere from 35 to 75 percent of the time when the eyes are closed (Brown, 1977).

Alpha slowing has been the most common finding in senescence (Obrist and Busse, 1965). The normal chronological adult alpha is 10.2 to 10.5 Hz, whereas the alpha level in mentally normal aged individuals is significantly lower with a mean frequency of 8.0 Hz. There is also a decrease in the number of tracings with activity above 10 Hz.

The foregoing discussion illustrates the need to consider each client on an individual basis and to gather data peculiar to that person. It is suggested that a baseline reading be determined on a subject for both frequency and amplitude before alpha training begins and that shaping be used to help a client achieve. Particularized goals in relationship to age, sex, metabolism and other unique factors must be considered with the training model.

Alpha Training and Stress Management

Alpha training appears to be one method to help the body relax and combat excessive amounts of stress called distress. Nature has provided humans with homeostatic mechanisms, such as those, not only to regulate fluid and electrolyte balance, blood pressure, heart rate, and wound healing, but also to readjust more complicated functional disorders that are of a mental nature. The concept assumes that when a person is exposed to excessively disturbing stimulation such as emotional or physical trauma, the brain has the potential to utilize natural biological processes to reduce the disturbing consequences of the stimulation. Thus, alpha training assists the individual in eliciting the relaxation response which helps the body's natural, self-healing mechanisms. The emphasis, then, lies in helping the natural systems use inherent unconscious potentials of self-regulatory adjustment.

The willful eliciting of the relaxation response has been found to be beneficial both to children and adults. Relaxation has been used successfully in treating such stress related disorders in children as insomnia, asthma, test anxiety, excitable behavior in psychotics, and hyperactivity (Cautela and Groden, 1978). Nathan and Charlesworth (1980) summarize research for adults which suggests that it is also helpful for phobic neuroses; anxiety neurosis; tension-related disorders such as headaches, backaches, and some earaches; alcohol and drug abuse; psychosomatic disorders; and depression. In recent months a number of authors on burnout have recommended the practice of periodic relaxation exercises for both

prevention and intervention (Matthews, 1980; Truch, 1980; and Culligan and Sedlacek, 1980).

In working with children in groups and teaching relaxation skills, it is difficult to have access to numerous encephalograph analyzers. The author in a recent unit research study investigated the use of wrist temperature as a measure of the principal brain wave frequency in an attempt to find an inexpensive biofeedback technique that would show the relaxation state. The skin temperature at the wrist, an increasing function of the volume of blood circulating to the extremities, seemed a reasonable candidate to be a proxy for the EEG dominant frequency. The study investigated the concurrent validity of the skin temperature at the wrist and the principal frequency of the brain wave. The examination was made during a one-week period with 30 boys and girls, aged 10 to 14 years, who were receiving alpha training. The children were in an experimental section of a research design which investigated the effects of alpha training on learning.

Conceptually, the investigation sought to assess the association between two measures of relaxation status, the principal brain wave frequency and the wrist temperature. The former measure was made on an Autogen 120a encephalograph analyzer. Two different types of observations were recorded: (1) the instantaneous dominant brain wave frequency (IEEG), and (2) the average dominant brain wave frequency over a 10-minute interval (AEEG). Wrist temperature was measured as Fahrenheit degrees on a Bio-temp band with the temperature sensor on the same side of the left wrist as the palm of the hand. Preliminary checks with the bands snowed them to be quite reliable measures of skin temperature.

Students received three sessions, lasting ten minutes each, of biofeedback training to achieve and maintain the alpha state. Five observations of IEEG and wrist temperature were made at two-minute intervals beginning two minutes into each training session, providing fifteen (3 x 5) pairs of measures for each subject. A single AEEG was observed at the end of each training session, providing three measures per subject. Preliminary work with the Bio-temp band alerted the researcher to the effect of ambient room air temperature on the measure of wrist temperature. Consequently, as each wrist temperature measure was observed, a corresponding measure of ambient temperature was recorded. If the ambient and wrist temperatures were associated, the association would tend, the researcher believed, to contaminate the measure of wrist temperature and obscure the association between the brain wave frequency and wrist temperature. The air temperature measure could be used to "factor out" or residualize the wrist temperature measure for ambient variation.

Several shortcomings of the limited investigation merit attention. First, a wide range of IEEG and AEEG measures would have helped the investigation. The range of such measures in the present investigation is sharply truncated, since the students were struggling, with increasing success, to keep the brain wave frequency within a narrow window of values between 8 and 12 Hz. Such truncation usually produces biased measures of association, causing the association to appear weaker than it is. The ambient air temperature measures were made in an air-conditioned classroom, again truncating the range of a variable. Finally, in an optimum investigation, a wide range of wrist temperatures should be observed. In

this investigation, wrist temperatures varied much more between subjects than within subjects since each sought that relaxed, at-ease state which is conducive to the alpha brain wave state. These comments illuminate the necessity for extreme care in generalizing these results.

The Pearson correlation coefficient between wrist temperature (w) and ambient temperature (a) was found to be slightly positive ($r = 0.21$, $p < .001$). The correlation between wrist temperature and instantaneous brain-wave frequency (IEEG) was not significant ($r = -0.08$, $p > 1.05$), perhaps because of a high degree of error in the readings of IEEG from a moving needle on the brain-wave analyzer. A much more stable, and therefore reliable, measure is the brain-wave frequency aggregated over a ten-minute period (AEEG).

The correlation between w and AEEG is slight, but negative, as anticipated, and significant statistically ($r = -0.12$, $p < .01$). The researcher concluded, then, that wrist temperature could be used as a rough measure of relaxation status, also measured by the brain-wave frequency. Whereas the weak correlation between the measures rules out the use of wrist temperature as a substitute of brain-wave frequency for individuals, mean wrist temperatures of groups of subjects should be useful as a measure of relaxation status and thus, could substitute for a measurement of brain-wave frequency.

In subsequent referrals to the experiment conducted by the author, the relaxation state was achieved with the boys and girls in the experimental group by either the EEG or wrist temperature for feedback. Table 1 in the appendix shows the before-and after-training wrist temperature for

twenty-four days during phase two of the study, and demonstrates that the skin gets warmer as the body relaxes.

Alpha Training and Achievement

Research dealing with alpha training and achievement is inconclusive. Some evidence substantiates the value of alpha training while other findings contradict it. Carter and Russell (1980) found significant increases in reading but not in arithmetic skills as a result of EEG alpha and beta training. In a study with learning disabled children, Gracenin and Cook (1977) found that alpha training with the experimental group produced no significant gains over the control group when total reading scores were examined. On the other hand, Patmon and Murphy (1978) in a study of hyperactive adolescent learning disabled students report improved reading achievement on the Wide Range Achievement Test with training in EEG frequency.

Methods of training for alpha other than biofeedback report more successes.

Luthe and Schultz (1969-71), with a method known as autogenics, report long-term effects on the improvement of scholastic performance and standardized test scores. Autogenic therapy basically consists of sitting in a chair or lying down for 10 to 15 minutes a day while concentrating on feelings of warmth and heaviness in the extremities. These exercises are then followed by meditation exercises, which involve various forms of visual and sensory imagery. For many counselors and researchers autogenics is combined with alpha biofeedback training to accelerate the process of gaining

control.

Sellers (1966) reported the results of a project using autogenics training over a four-year period with 240 underachieving high school and college students. He hypothesized that many students of normal intelligence perform below their ability because of severe stress or anxiety. Furthermore, many students who have been "negatively conditioned" by years of anxiety and failure learn to protect their egos by rejecting academic and intellectual endeavors. His results indicate positive treatment effects on concentration, study habits, listening ability, reading and writing skills, and an increased sense of self-worth.

Georgi Zozanov (1969), a Bulgarian at the University of Sofia found that by one's teaching the brain to relax from all stress, the mind could learn at a rate from five to fifty times faster and far more efficiently. The method now is known as "Suggestopedia," and has proven that hundreds of people effortlessly learned a foreign language, the vocabulary and grammar of which were equivalent to a two-to three-years college course, in as little as sixty days. Follow-up studies revealed, also, that as late as a year afterwards virtually none of the materials had been forgotten.

Florence Schale (1970) found that students at Northwestern University when taught to relax to the alpha state learned to read much more rapidly. From one to five percent of her students developed the ability to read at rates of over 20,000 words per minute.

Speed learning has been tried with middle school children. An eighth grade science class at the Woodrow Wilson Junior High School in Des Moines, Iowa, learned science material rapidly by breathing rhythmically

in time to music as they heard the material read to them in various intonation paced to the music. This same method was tried in DeKalb County Schools in Georgia for remedial reading instruction and gains of one year's reading ability were noted within a few weeks (Ostrander and Schroeder, 1979).

In a recent study, the author, when using a combination of alpha (EEG), wrist temperature, and autogenic training with 62 middle school students, did not find a significant difference in achievement between the experimental and the control groups. It was hypothesized that pupils whose study of French was undertaken with alpha training would tend to demonstrate greater overall cognitive achievement in French than comparable pupils whose study of French was undertaken without alpha brain wave training. The students, who volunteered for the eight-week summer program, were grouped randomly for the experimental and control groups. The students received three experiences: a six-week course in French, and two special one-week sessions not associated with French. The order of the latter sessions was reversed to comprise the treatment variable. These two sessions were: (1) a one-week training program of relaxation, aimed at widespread achievement of the alpha state or pattern, as verified by the EEG, and (2) a one-week activity entitled "Instant Theater Workshop" in which participants performed for their peers in a series of self-expressing exercises. This latter activity served as a placebo and a device for keeping subjects blind to the nature of the research design.

The experimental group received the one-week of alpha training at the beginning of the program while the control group participated in instant theater. This arrangement was reversed the last week of the program. The six weeks of French instruction was the same for the two groups with the

exception of the experimental group receiving 10 minutes of alpha training at the beginning of each day's three hours French instructional period. The control group received no special training during the same 10 minutes. To control for teacher variable, the teachers exchanged groups in the middle of the program. The instruction each day consisted of speaking, listening, writing, and reading activities taught with an auditory-visual approach.

Four overall achievement measures were made on all subjects who completed the French classes. The measures were subtests of the Primsleur French Proficiency Test. The subscales were as follows: speaking, listening, writing, and reading. The four scores were summed to produce a total score. Table 2 in the appendix reports the five t-tests for mean differences for each subscale and the total score between the two groups. In none of the comparisons was a mean difference observed which was statistically significant.

Alpha Training and Other Behavioral Changes

One of the most noticeable changes in persons who receive alpha training is the tendency to turn the attention inward. This conditioning reduces the amount of attention paid to external factors and leads to a decrease in mental tension or remination about social pressures, and this effect in turn alters the significance that the individual attaches to external environmental situations and stimuli (Brown, 1977).

It is thought to be important to health that a person feels "in control." J. B. Rotter (1966) spoke of the internal versus external expectancies as the locus of control. It represents the degree to which

a person feels that what happens to one depends on one's behavior--a feeling of internal control--as opposed to feeling it is dependent on chance, fate, or is under the control of powerful others--external control. Internal locus of control is not something which is inborn. It must be learned by the individual.

Orne (1965) points out that school can be conceived of as a stressor for a child, which, he reacts to with hyperactivity, and lack of attention. The stimulus, school, is defined as a stressor, not by its objective qualities, but rather by its effect on the individual. Alpha training may provide the individual with the internal control needed to deal with the stimulus. Thus, he will tend to be able to tolerate similar stimuli of somewhat greater intensity in the future. Orne concluded by emphasizing that in order to succeed, individuals must have control over their behavior.

The idea of control over one's life has been helpful in working with alcoholics. Green, Green, and Walters (1973) indicate that therapy which includes alpha biofeedback training helps the individual to realize the extent to which self-control may be learned.

While using autogenic training to produce alpha with Japanese children and adolescents for various medical disorders, Luthe (1969) noticed changes in behaviors and interactional processes. Teachers also reported noticeable improvements in classroom participation, a decrease of distractibility, improved attention, better concentration on tests, and increased homework performance.

Nall (1973), after informally observing what appeared to be positive effects of alpha training with hyperactive children in a special school for

children with behavior problems, conducted a study using an alpha training group, a placebo group, and a control group. Comparisons between the training and the placebo groups were inconclusive, although Nall noted that the training appeared to be very beneficial with particular children.

In the same study by the author referred to earlier in this paper, behavioral changes in the students who participated in alpha training were observed. As soon as the French lessons began, there was evidence that the experimental group, which received daily autogenic or alpha training, seemed more manageable, less overtly competitive, and less likely to exhibit disruptive behaviors. In order to measure the frequency of disruptive behaviors, a simple observation form was developed. Eight types or examples of disruptive behavior were listed for the subject: (1) difficulty concentrating for any length of time; (2) overactivity, restlessness, and/or continual shifting of body positions; (3) disturbing other children by talking, teasing, provoking fights, or interrupting; (4) moving inappropriately out of seat; (5) seeking attention from peers; (6) responding inappropriately to teachers; (7) giggling or laughing inappropriately; and (8) uttering nonsense syllables and/or babbling to oneself. An observer counted the incidence of such behaviors, without regard to the specific type, within a two-minute interval. Observations continued for five consecutive two-minute periods. The total incidences of disruptive behavior were determined by summing the frequency of such behavior in the five time intervals. The observer made all the observations with the observation form. The two classes were observed on the same days during periods in which they participated in similar activities. These pairs of observations

were used to test the following research hypothesis: Middle school students who receive relaxation training and daily relaxation exercises will tend to exhibit fewer incidences of disruptive behavior than comparable students without relaxation training or exercises. The Wilcoxon matched-pairs signed-ranks test (Ferguson, 1971) was used to test the null hypothesis. The test statistic, W+, was found to equal 0.00 and therefore was significant beyond the .005 level of significance. In no pair of observations was the number of disruptive behaviors for the control group lower than that for the experimental group. Refer to Table 3 in the appendix for details of the test.

On the basis of the author's limited research, there appears to be a rather dramatic result related to retention and alpha training. Of the 62 students who enrolled in the French classes, 14 dropped out of the project before its end. While parents were urged to encourage their children's attendance, no extraordinary effort was made to ensure the students' continued enrollment. Care was taken to assure that the two groups were treated alike in the discouragement of dropouts. Of the 14 dropouts, only 3 left the experimental group and one of these was hospitalized and could not complete the lessons. Eleven students dropped out of the control group. Table 4 in the appendix reports the results of a test of the difference of two independent proportions in order to test the following research hypothesis: Students who receive relaxation training will drop out of the French classes at a lower rate than comparable students who receive no relaxation training. The hypothesis is supported at the 0.05 level of significance.

The researcher was interested to determine whether the dropouts in the two groups differed in average intelligence. Intelligence was measured prior to the study using the Otis-Lennon Mental Ability Test, Intermediate Level, Form J. The mean IQ for the three dropouts in the experimental group was 95.33. The corresponding mean for the eleven dropouts in the control group was 99.09. The standard deviation for the two groups were 6.81 and 11.07 for the experimental and control groups respectively. The observed value of t was not significant ($t = -0.55$, $df = 12$, $p > .10$). Thus, the evidence does not support the contention that the two groups of dropouts differed in academic aptitude.

Implications for the Helping Profession

Alpha training is an additional technique useful for the helping profession for some individuals. Since the approach emphasizes voluntary self regulation, it can be used for remediation and crisis intervention as well as for personal development, burnout prevention, and stress management.

A major use for alpha training is in the area of psychologic self-exploration (Brown, 1977). A consequence of learning how to sustain different brain states is the subjective effect. Even though EEG's are recorded at a distance from important brain structures and are a mish-mash of many different kinds of brain electrical influences, there are a number of defined and potentially definable relationships between brain electrical activity and subjective feeling and thought activity. When any of these EEG components is sustained over any appreciable period of time, the presence of

the feeling or thought states in consciousness, even liminal consciousness, could easily elicit or attract associated subjective material, be integrated with the ongoing subjective activity, and result in new "insights" or change in perspective.

Not only does alpha training encourage voluntary self-regulation of physical, mental, and emotional processes, it teaches self-responsibility. When the client learns to operate the machine, keep records of personal progress, and set realistic goals from the baseline data, the individual is assuming responsibility for the learning process.

The technique is appropriate for children and adults of all levels of intellectual functioning. For the counselor who works with large numbers of individuals who have limited vocabularies, it is a particularly efficient method. When the client or counselee shares in the therapy, the counselor is freed from excessive verbalization and becomes a facilitator in the self-discovery learning process. The new role is one of a data interpreter and feedback clarifier. The counselor assists the individual in learning to operate the monitor, read and accept the feedback information for increased self-awareness, and correlate psychological with physiological changes to produce self-regulation.

Some counselors have found a combination of individual counseling plus biofeedback alpha training to be helpful. The combination approach has been particularly useful with alcoholics and other drug addicts (Brown, 1977; Green, 1977). In recent years it has also been tried with child abusers (Danskin and Lowenstein, 1977). Through the use of autogenic tapes, the learning process can continue at home, speeding up therapy. The

counselor must understand that maximum benefits are received with daily practice.

Although alpha training affects individuals differently, some reports (Danskin and Lowenstein, 1977) indicate general cognitive and affective results that are: improved concentration with fewer breaks, increased memory, improved attitudes of acceptance, high energy levels, a more relaxed state of being, greater self confidence, increased ability to prioritize goals, and a release of creative ideas. Some other benefits are the ability to cope with tension, go to sleep more readily, need less sleep and still be mentally alert, experience less frequent tension headaches, and obviate nervous twitches. Since the method encourages a holistic approach to living, in many cases more than one disturbing condition improves.

Summary

The purpose of suggesting the usefulness of alpha training is not to imply that the traditional role of the counselor-counselee relationship is not important. The one-to-one interaction counseling and small group approaches will always have merit. One can readily see, however, that the case load is so great per counselor that new methods as alternatives are needed to facilitate better and more efficient services for those who can benefit from them. Alpha biofeedback training appears to be another highly significant technique which, if properly learned and applied, is successful in changing behavior toward desirable goals in a wide range of situations.

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APPENDIX

TABLE 1

DAILY MEAN WRIST TEMPERATURES FOR STUDENTS IN THE EXPERIMENTAL GROUP MEASURED PRIOR AND SUBSEQUENT TO RELAXATION EXERCISES

(N = 24)

Date	Temperature (^{o}F) Before Exercises	After Exercises	Differences
6-15	90.09	90.79	0.70
6-16	89.67	90.21	0.54
6-17	90.81	91.29	0.48
6-18	90.29	90.83	0.54
6-19	90.36	91.86	1.50
6-22	91.14	92.60	1.46
6-23	90.35	91.46	1.11
6-24	88.98	89.71	0.73
6-25	89.91	90.98	1.07
6-26	90.41	91.72	1.31
6-29	88.31	89.96	1.65
6-30	90.58	90.84	0.26
7- 1	89.50	91.19	1.69
7- 2	90.26	91.74	1.48
7- 6	91.19	92.67	1.48
7- 7	91.75	94.33	2.57
7- 8	92.28	93.83	1.55
7- 9	90.96	93.38	2.42
7-10	90.65	92.50	1.85
7-13	89.59	91.70	2.11
7-15	89.21	91.12	1.91
7-16	89.72	91.58	1.86
7-17	89.15	90.71	1.56
7-20	90.71	91.76	1.05
Mean	90.2450	91.6150	1.3700
S	0.9053	1.1495	0.6141

t_o = 10.93, df = 23, p < .0005

TABLE 2

RESULTS OF FIVE T-TESTS FOR MEAN DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS ON THE FOUR SUBSCORES AND THE TOTAL SCORE OF THE PRIMSLEUR FRENCH PROFICIENCY TEST

Group	N	Mean	Standard Deviation	t[a]
		Speaking Subscore		
Experimental	27	41.33	13.11	1.04
Control	20	36.85	16.50	
		Listening Subscore		
Experimental	27	13.11	4.20	-0.40
Control	20	13.60	4.04	
		Writing Subscore		
Experimental	27	5.07	4.53	-0.88
Control	20	6.55	6.96	
		Reading Subscore		
Experimental	27	9.22	3.11	1.09
Control	20	8.30	2.45	
		Total Score		
Experimental	27	68.74	26.29	0.45
Control	20	65.30	25.83	

[a]The critical value of t at the 0.05 level of significance for each test is $t = 1.68$. No observed value of t exceeded the critical value.

TABLE 3

REPORT OF FREQUENCY OF DISRUPTIVE BEHAVIORS FOR THE EXPERIMENTAL AND CONTROL GROUPS WITHIN ELEVEN OBSERVATIONS OF TEN MINUTES EACH

	Frequency of Disruptive Behaviors			
Observation	Experimental	Control	Difference	Signed Rank
1	5	15	-10	- 6
2	7	13	- 6	- 4
3	1	8	- 7	- 5
4	5	22	-17	-10
5	4	6	- 2	- 1
6	9	28	-19	-11
7	14	27	-13	- 8
8	10	15	- 5	- 3
9	3	15	-12	- 7
10	17	20	- 3	- 3
11	13	27	-14	- 9

The sum of positive signed ranks, W+, equals 0. Such a statistic is significant beyond the .005 level of significance.

TABLE 4

RESULTS OF THE FISHER EXACT TEST OF THE DIFFERENCE OF TWO INDEPENDENT PROPORTIONS OF STUDENTS WHO DROPPED OUT OF FRENCH CLASSES BEFORE THE PROJECT'S END

Total number of students	62
Total number of dropouts	14
Proportion of dropouts	0.23
Proportion remaining	0.77
Control Group	
Number of students	31
Number of dropouts	11
Proportion of dropouts	0.355
Experimental Group	
Number of students	31
Number of dropouts	3
Proportion of dropouts	0.097
Fisher exact probability[a] that the two proportions do not differ.	0.017*

*Significant at the 0.05 level

[a]See Chapter 22, Section 11, of George A. Fergerson's Statistical Analysis for Psychology of Education, 3rd Edition, 1971.